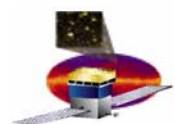


GLAST Large Area Telescope: AntiCoincidence Detector (ACD)

Mechanical Ground Support Equipment

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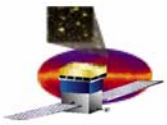
MGSE Requirements

- **ACD-REQ-7002, ACD MGSE Requirements**
- **General Requirements Summary**
 - Provide safe methods to lift, move, position, and transport the Instrument
 - Design and test per NASA requirements
 - Design MGSE to be compatible in all Integration and Test (I&T) areas
 - Design loads to incorporate worst case static weight and Center of Gravity (CG)
 - Design factors of safety are 5:1 for ultimate and 3:1 for yield
 - Proof test factor of safety 2:1
 - Meet contamination requirements of cleanrooms and Thermal Vacuum Facilities
 - Position and support the ACD as required during all tests
 - Provide adequate access to integrate and test all components
 - Lifting sling requirements
 - No critical welds
 - Meet stability requirements
 - Proof test annually
 - NDE on all lifting hardware
 - Components color coded or tethered to prevent interchangeability



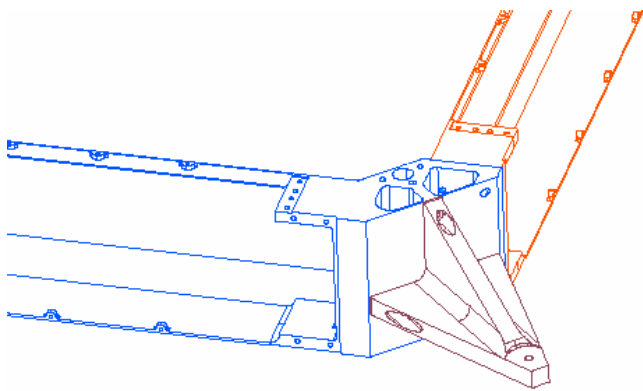
MGSE Overview

- Specific Pieces of MGSE
 - **Multi-Purpose Lift Sling**
 - **ACD/BEA Dolly**
 - **TSA Dolly**
 - **Multi-Purpose Test Fixture**
 - **Rotation/Tilt Device**
 - **Templates**
 - **Mass Simulators**
 - **ACD Shipping Fixture**
 - **Micrometeoroid Shield/Thermal Blanket Mockup**

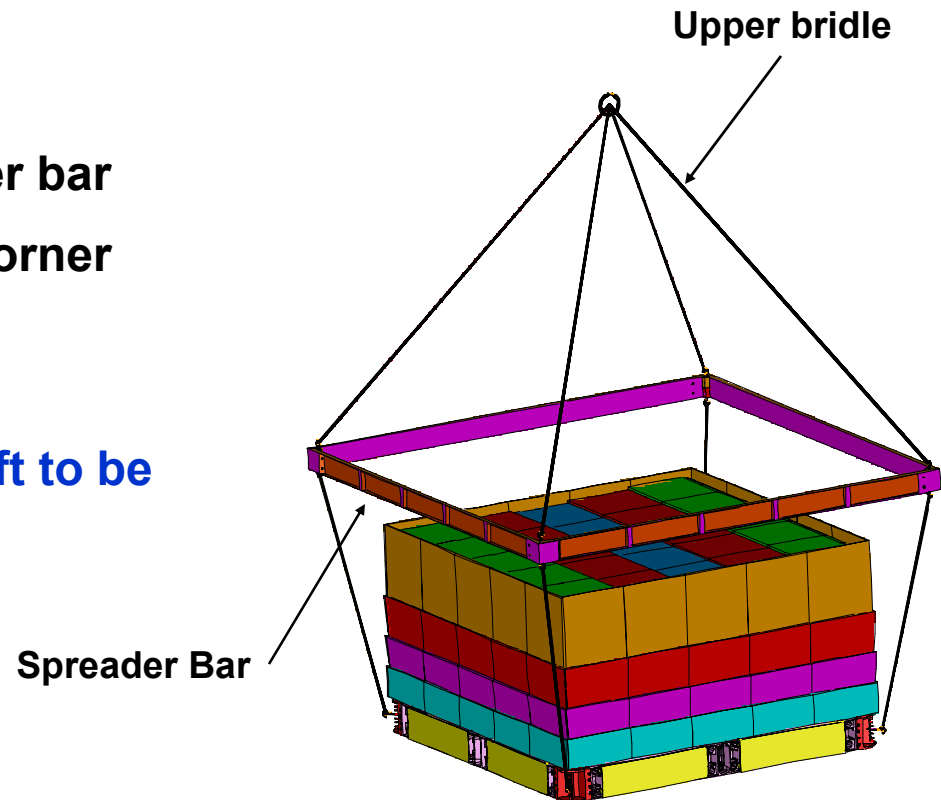


Multi-Purpose Lift Sling

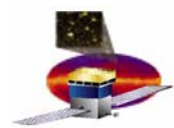
- **Basic Requirements**
 - **Lift TSA, BEA, and ACD**
- 4-leg lifting sling with spreader bar
- Using existing spreader bar corner fittings from a SMEX lift sling
- Lifting below center of gravity
 - **Stability analysis shows lift to be stable**



Lift Fitting (4 corners)



ACD Lifting Configuration

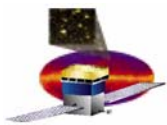


ACD/BEA Dolly

- Basic Requirements
 - Provide transportation of BEA and ACD during I&T
 - Make four sides and interior of ACD easily accessible for integration and test.
 - Support both the BEA and ACD
 - Flatness shall emulate the LAT interface (i.e. LAT Grid)
- Located 3 dollies that would be suitable for our use with minor modifications
 - 2 GLAS Dollies
 - Swift Dolly

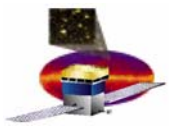
GLAS Dolly





TSA Dolly

- Basic Requirements
 - Provide transportation of Shell and TSA during I&T
 - Make four sides and interior of ACD easily accessible for integration of Tile Detector Assemblies
- One of the three dollies located will work as the TSA Dolly
- Interface to shell flexures needs to be designed
 - Similar design as shell template

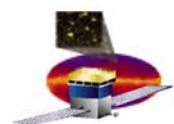


Multi-Purpose Test Fixture

- Basic Requirements
 - Vibration fixture
 - Simulate the LAT Grid mechanical interface
 - Thermal Vacuum Fixture
 - Simulate LAT Grid temperatures using thermal control
 - Simulate LAT Tracker thermal boundary conditions by using radiative temperature controlled panels
 - Support the ACD during rotation and tilt operations

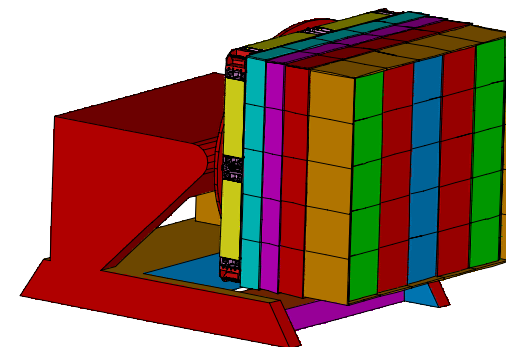


- Status – Requirements defined, design not started



Tilt/Rotation Device

- Basic Requirements
 - Tilt the ACD 90°
 - Required to maximize cosmic ray muon flux normal to the side TDA's
 - Rotate 360° about the Z-axis while tilted 90°
 - Enables full coverage on all 4 sides



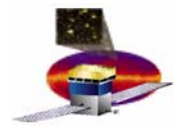
ACD shown tilted 90°



- Use existing hardware
 - Ransome Table Model 100P

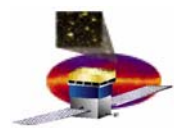
← Ransome Table shown with GLAS Engineering unit installed

- Status – Ransome table ready for use, interface fixture (i.e. Multi-Purpose Test Fixture) required



ACD Mass Simulators & Templates

- **Mass Simulators Required**
 - **Tiles**
 - **For ACD Mech. Verification Testing**
 - **Electronics Chassis Assembly**
 - **For ACD Mech Verification Testing**
 - **ACD**
 - **For ACD Shipping Qualification**
- **Templates Required**
 - **Shell**
 - **Also used for Shell Flexures**
 - **BFA**
 - **Two places**
 - **For Shell Flexure Attachments**
 - **For BEA Corner I/F to LAT**



ACD Shipping

- Use Existing Hardware from GLAS project
- GLAS BAP
 - Designed for a 300 kg payload
 - Load isolation system included
- Very easy to use – Does not require hazardous operations
 - Roll onto truck, raise casters, tie down and go

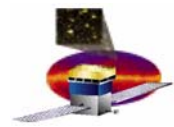


GLAS BAP with Load Isolation System
(shown during load testing)



GLAS BAP installed in trailer
(shown during road testing)

- Bag and Nitrogen purge ACD during shipping
- Transport via environmentally controlled air-ride trailer



Micrometeoroid Shield/Thermal Blanket Mockup

- Use existing ACD Mockup as a template to build the Micrometeoroid Shield/Thermal Blanket (MS/TB)
 - All MS/TB attachment points to be simulated



ACD Mockup



MGSE Summary

- **Extensive use of existing hardware will save the ACD both cost and schedule**
- **Requirements fully defined**
- **Design and Analysis needs to be completed**
- **MGSE will be ready when required**